An integrative review of exercise interventions among community-dwelling adults with Alzheimer’s disease

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05 Summary
Alzheimer’s disease

– A global epidemic: more than 5.7 million patients; 6.3 cases per 1,000 person-years
– Impact: patients; caregivers
– lack of drugs for AD
– non-pharmacological approaches such as exercise have become more important.

(APA, 2000; Castellania & Perry, 2012; Chan et al., 2013; Cummings, Morstorf, & Zhong, 2014; Liu et al., 2017; Alzheimer's Association, 2018)
The protective effect among older people

• Mechanisms: cardiovascular and cerebrovascular system; neurotrophic effect; stress and inflammation, insulin sensitivity

– Animal models of AD also showed that exercise was neuroprotective

(Alkadhi & Dao, 2018; Erickson et al., 2011; Kennedy, Hardman, Macpherson, Scholey, & Pipingas, 2017; Koo, Kang, Oh, Yang, & Cho, 2017; Zhang et al., 2018; )
The effect of exercise on cognitive functions

– Yet it is unknown among people with AD

• The heterogeneity of study design (i.e., mixed type of dementia, types, frequency, duration, and intensity of exercise, comparator groups, the use of multicomponent interventions, and outcome measurements)

• Bias in program implementation

(Forbes, Forbes, Blake, Thiessen, & Forbes, 2015; Frederiksen, Gjerum, Waldemar, & Hasselbalch, 2018; Gill Livingston et al., 2017; Guitar, Connelly, Nagamatsu, Orange, & Muir-Hunter, 2018 Livingston et al., 2017)
Over 80% of people with AD live in communities.
Home is the best place to care for persons with dementia.

(Alzheimer's Association, 2018; Alzheimer’s Disease International, 2017; Bokberg, Ahlstrom, & Karlsson, 2017)
• Synthesize exercise interventions among community-dwelling adults with AD on health-related outcomes and to provide direction to develop and/or implement appropriate exercise programs to benefit patients and their families
Whittemore and Knafl’s integrative review framework
– problem identification, literature search, data evaluation, analysis, and presentation

• January 2018 and March 2018; CINAHL, PubMed, Cochrane, EMBASE, and Web of Science

• Inclusion criteria: 1) diagnosis of AD; 2) living in the community; 3) intervention studies; 4) interventions including but not limited to physical activity or exercise; 5) sample size larger than 10; 6) published in English.

• Exclusion criteria: poor quality
n = 2640 references identified through database search

n = 2219 references for screening on titles and abstract based on study relevance

n = 2109 references excluded because of unsatisfied criteria

n = 110 studies for screening on full text

n = 7 studies excluded because the participants don’t live in community
n = 3 studies excluded because sample size less than 10
n = 21 studies excluded because the participants are diagnosis of dementia, not limited to the AD
n = 32 studies excluded because the intervention didn’t contain exercise or physical activities
n = 7 studies excluded because the results doesn’t present on the papers
n = 20 studies excluded because the process of research doesn’t present on the papers

n = 20 studies included through database search

n = 24 studies included in the review

n = 421 references excluded because of duplication and premature publishing date

Figure 2 the result of quality assessment.

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Location</th>
<th>Study Design</th>
<th>N</th>
<th>Age</th>
<th>Gender</th>
<th>Handicap</th>
<th>TMT</th>
<th>FITT</th>
<th>Length of intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gass et al. (2018)</td>
<td>USA</td>
<td>RCT</td>
<td>30</td>
<td>70-85</td>
<td>mild to moderate</td>
<td>high</td>
<td></td>
<td>4 months</td>
<td></td>
</tr>
<tr>
<td>Hulsman et al. (2017)</td>
<td>Denmark</td>
<td>RCT</td>
<td>20</td>
<td>70-75</td>
<td>mild</td>
<td>high</td>
<td></td>
<td>4 months</td>
<td></td>
</tr>
<tr>
<td>Palfalvi et al. (2016)</td>
<td>Italy</td>
<td>RCT</td>
<td>30</td>
<td>70-85</td>
<td>mild</td>
<td>high</td>
<td></td>
<td>4 months</td>
<td></td>
</tr>
<tr>
<td>Samson et al. (2012)</td>
<td>Australia</td>
<td>RCT</td>
<td>40</td>
<td>81-85</td>
<td>mild</td>
<td>high</td>
<td></td>
<td>6 months</td>
<td></td>
</tr>
</tbody>
</table>
Characteristics of participants

- 24 papers with 17 studies
- 1068 participants
- Generally older than 60 years’ old
- Fifteen studies had a male participation rate of 50% or higher
11 studies mentioned general health, which all appeared beneficial to different aspects, including health-related physical fitness, sleep quality, and metabolic variables.

- 9 studies reported the effects on cognitive ability and 2 studies showed the positive effects.
Exercise is proved to be effective in physical fitness, but the effect of exercise on cognitive function couldn’t be determined.

It was consistent with the findings of other systematic reviews (Littbrand et al., 2011; Forbes et al., 2015; Chen et al., 2018).
The baseline condition of participants

- Severity of dementia, and comorbidities
- Lack of formal questionnaires to obtain comorbidities and exercise levels at baseline

The sensitivity of measurement tools

- MMSE: 8/9 studies
- Objective measurements (e.g., MRI): 1 study
Variety in the type, frequency, time, and intensity of exercise and length of intervention

- around 150 minutes per week (World Health Organization, 2018)
- multiple exercise types
- lack of professional and accurate indexes to monitor the intensity of exercise, such as weight load, heart rate, talk test or BRPE.
Processes of implementation

– Adherence: initiative for participation, attendance or delivery fidelity

– Treatment fidelity: keep consistency between implementation and plan by taking systematic and comprehensive approaches in aspects of study design, interventionist training, treatment delivery, treatment receipt, and treatment enactment
SUMMARY

- Exercise is a promising therapy to ameliorate the cognitive ability among people with AD living in the community;
- Sensitive outcome measurements combined with objective indicators, as well as the professional and accurate methods monitoring the intensity of exercise should be used in the future;
- Treatment fidelity is essential to minimize the interference of confounding factors coming from researchers, intervenors and patients.
Thank you!